

# PATENT ABSTRACTS OF JAPAN

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(54) METAL SALT MIXTURE ARISING FROM PAPAYA AND ITS PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To inexpensively and efficiently produce a metal salt mixture comprising salts of minute quantities of essential metals, zinc, copper, iron and manganese, and salts of usual quantities of metals, calcium, potassium, magnesium and sodium from papaya in a preferable state for ingestion to human body.

SOLUTION: This metal salt mixture comprising salts of minute quantities of essential metals, zinc, copper, iron and manganese, and salts of usual quantities of metals, calcium, potassium, magnesium and sodium, is readily prepared in high yield by drying leaves, petioles, stems or rhizome parts of papaya widely cultured in regions between subtropical and tropical zones, firing and carbonizing it alone or by an electric furnace and then extracting it with water or an aqueous medium. As this metal salt mixture contains abundantly vitamins, it is appropriate for ingestion to human body, capable of widely utilizing it and useful for effectively utilizing leaves, petioles, stems and rhizomes dumped in the past.

## CLAIMS

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### [Claim(s)]

[Claim 1] Metal salt mixture which extracts and is obtained from the leaf, the petiole, stem, or rhizome of a papaya [claim 2] Metal salt mixture with which metal salt mixture consists of the salt of the salt of calcium, a potassium, magnesium, and the common quantum element of sodium and zinc, iron, copper, and the minute amount essential element of manganese and which was indicated by claim 1.

[Claim 3] The manufacture approach of the metal salt mixture which dried the leaf, the petiole, stem, or rhizome of a papaya, and was indicated by remaining as it is or claims 1 or 2 which consist of extracting by water or the aquosity medium after carrying out heating at high temperature and carrying out carbonization processing with an electric furnace etc.

## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the approach of manufacturing the mixture and these metal salt mixture of a salt of a useful metal, such as a papaya (or papaya), the useful metals, i.e., calcium, which are especially obtained from the leaf, the petiole, stem, or rhizome of a papaya, a potassium, manganese, magnesium, sodium, iron, copper, zinc, and sodium, by extract.

[0002]

[Description of the Prior Art] The sea is the location of life birth and the living thing is taking in the nutrient from growth environments, such as air, water, and the earth, again. Therefore, it is known that about 60 sorts of elements exist among 92 sorts of elements which the living thing contains various elements depending on a habitation environment, for example, are discovered by the body on the earth.

[0003] although they be similar regardless of an animal or a vegetation although element distribution situations in the living body differ a little in a class, a growth environment, etc., for example, chlorine, a potassium, sodium, magnesium, and calcium be include as a common quantum element again at the body by use oxygen, carbon, hydrogen, nitrogen, and Lynn and sulfur as a main configuration element, the element call the essential trace element group which exist only in several ppm or the minute amount not more than it be also contain. As such an essential trace element, although 15 elements of silicon, a fluorine, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, an arsenic, a selenium, molybdenum, tin, and iodine are now authorized, all are contrastive with being a heavy-metal element and a living body's main configuration element being the so-called light element. Only within the case where it exists in a minute amount within an organism although the heavy-metal element which is these essential trace elements has played the role important with ultralow volume as a vitamin again as an enzyme or a coenzyme in the living body and the abundance and intake change with the class of element, a developmental stage, sex, etc., it is indispensable to maintenance of growth normal [ of a living thing ], or a life activity, and is involving deeply to a function complicated [ that it is the altitude of much physiological reactions or a living thing ].

[0004] It is supposed on the average that two to 2.3 g and manganese total [ 4.0g and zinc ], residual indispensable trace elements, such as 0.1g and other seleniums, nickel, cobalt, and chromium, total [ 0.20g and copper ], and iron is the man inside-of-the-body content of these minute amount  
\*\*\*\*\* about 0.1g. Especially, zinc, iron, and copper form many enzyme groups in the living body, and manganese is the configuration element of Spa-oxide DISUMUTA-ZE and is participating in function and life reaction of a living body directly.

[0005] On the other hand, if it is an indispensable condition that it is a minute amount, a minute amount essential element is put in another way, and these trace elements act effective in a living body whenever it exists in a minute amount, and the so-called optimum dose range is crossed, an excess symptom is occurred and the superfluous failure is fatal in many cases. That is, a trace element is a heavy-metal element, as mentioned above, and although a toxic element and two sides of the same coin are so accomplished and not an overstatement but the optimum dose range changes with the class of element, a living body's kind, sex, a living body's magnitude, developmental stages, etc., the description is generally very narrow.

[0006] In connection with the taste to Japanese-style food traditional in recent years falling generally on the other hand, the spread of instant food, such as a pan, a processed food, snack foods, etc. accelerates, and it is becoming clear that the lack of a minute amount essential element other than malnutrition diseases, such as loempe by lack of common quantum elements, such as calcium, and a vitamin and fracture, is participating in the onset of many illnesses and failures in connection with these extreme imbalanced food intakes. being such -- the illness -- a failure -- \*\*\*\*\* -- for example -- an essential trace element -- a deficiency disease -- being typical -- a thing -- \*\*\*\*\* -- iodine -- depending -- a goiter -- a selenium -- iron -- depending -- anemia -- zinc -- an element -- \*\*\*\* -- growth inhibition -- the oligospermia -- prostatic hypertrophy -- the dysgeusia -- chromium -- depending -- sugar - lipid

metabolism -- unusual -- having been related -- an azoospermia -- the skin -- an eye -- many -- a disease -- iron -- an element -- lack -- depending -- anemia -- etc. -- mentioning -- having . Especially zinc is an element indispensable to composition, and the cell division and protein synthesis of DNA and RNA, and is deeply applied to the function of extensive body \*\*\*\*\*, such as recovery of skin disease, such as formation and development of a cerebrum or a nervous system, growth of the hair or a pawl, a function of a retina or the uvea therefore maintenance of eyesight, metabolism of the skin therefore psoriasis, and a wound, and maintenance of a sense-of-smell function.

[0007]

[Problem(s) to be Solved by the Invention] Although such minute amount essential elements are contained in various animal foods and vegetable foods, \*\*\*\*\* of our country is [ the animal which carries out the food intake of the vegetation and such vegetation which are volcanogeneous soil, therefore grow up in soil except for some accumulator plants compared with European and American calcific soil ] low. Instead, although natural water, such as river water of our country, an underground water, and lake water, has the advantage that pH is neutrality mostly low relatively, the metal content is suitable for drink, and it is delicious, when taking in a common quantum element and essential trace elements, a thing disadvantageous as a whole cannot deny it.

[0008] Although the defect on the nutrition which originates in such soil by catching so much the thing of the season when a nutritive value is high for a fishery product or seaweed from ancient times by using grain as the staple food in addition to greenstuff has been compensated in our country, season nature fades in recent years by technical reform in agriculture and the fishery fields, such as forced agriculture and culture, and the problem of the imbalance of nutrients, such as amino acid, a vitamin, and a mineral, is invited. Therefore, in order that the increment of the disease and failure which were described above besides the general adult disease and which solve and originate in lack of an essential trace element may be enhanced and they may cope with this, the mineral supplements which used as the base the inorganic compound and inorganic \*\*\*\*\* compounded chemically of the natural mineral origin, such as ferrous chloride as an anemia therapy agent, are marketed. However, an old age person, a juvenile person, and an adult should not necessarily satisfy that a side effect with absorptivity remarkable in becoming low again is discovered with intake conditions, such as health condition, etc., either. Moreover, especially in the case of a trace element, since it is very narrow, usual cannot respond at all with the inorganic compound chemically compounded in respect of recipe fitness, a side effect, etc., except that the optimum dose range changes with elements.

[0009]

[Means for Solving the Problem] Even if it carries out an ingestion in view of such a situation, although they have continued examination wholeheartedly, variously it, so that \*\* may also develop few mineral components of a side effect with sufficient absorptivity as for this invention persons As a result, also unexpectedly, the leaf, trunk scapus, and leaf of a papaya remaining as it is or by extracting by the aquosity medium, after carrying out carbonization processing of these The useful metal mixture which consists of a common quantum element and a trace element completed a header and this invention for \*\* being obtained by intake of the body in the desirable condition by high yield simply.

[0010] A papaya (*Carica papaya*) is the evergreen tree of the tropical United States native department of a papaya, and \*\*\*\* cultivation is carried out in the subtropical zone and tropical every place. It will be the early fruit tree of growth, and if seeding of the height is attained and carried out to 3 - 4 meters, it becomes fruitful for the year and conditions avoid, the life will be five years or more. For die length, 20 thru/or 40cm, and width of face are [ 10 thru/or 20cm, and the weight of the fruits of a papaya ] 0.45 thru/or 2kg, and although pulp has peach yellow thru/or a characteristic smell in red, it is [ flavor ] and is delicious. Since cultivation of a papaya is very easy, the tropical zone is grown from the first in the country subtropical [ the great portion of ], full ripeness fruits are eaten as a salad, a pie, juice, and a cake as fruits at the time of breakfast again, and also unripe fruits were used as vegetables like an Oriental pickling melon, and occupy the important location in people's eating habits.

[0011] Moreover, although white juice will ooze out and solidify if a shallow blemish is given to the unripe fruits of a papaya, the papain which is proteolytic enzyme is obtained by drying this with low

heat and considering as powder. this protease -- chymopapain etc. -- being alike -- although used as a tenderizer of meat as remedies, such as dyspepsia, for many years again, it is in the limelight as a remedy of a discopathy poured into the direct affected part in the United States and Canada recently.

[0012] Having the centrum inside, the circulation as goods also being limited only to a cultivation area, since a long haul cannot be borne that it is easy to hurt, and the fruits of a papaya wrapping the flesh of animals that it is \*\*\*\* in natives, such as a point of origin, as applications other than fruits in the leaf of a papaya, making it soft, and presenting cooking is only known.

[0013] Since a tree is cut down a little early since fruition will become small [ fruits ] few again if it will wither and die if atmospheric temperature generally becomes 10 degrees C or less, although the huge palmate leaf which the trunk of a papaya is a single trunk, and the interior is hollow, and has a long petiole comes out of the parietal region, and also it becomes an old tree, and it prepares for the next seeding and cultivation, the amounts of generation of \*\*\*\* are other large quantities of a thought.

[0014] The leaf of the papaya with which the age of a tree generates this invention persons comparatively short, therefore so much, The result of having repeated research wholeheartedly paying attention to the deployment of trash, such as a petiole, a stem, or a rhizome, By extracting by water or the aquosity medium, after drying and grinding the leaf, the petiole, stem, or rhizome of a papaya, and water or an aquosity medium extracting as it is subsequently or carbonizing with an electric furnace etc. A header and this invention were completed for the useful metal mixture which consists not only of a common quantum element but of a minute amount desperate element also unexpectedly being obtained. That is, if cut down a papaya tree in the root section after extract fruits, and dig up a rhizome, a leaf, a petiole, a stem, or a rhizome be dry and grind in proper magnitude, the back water or the aquosity medium which extracted by water or the aquosity medium as it was, or carried out baking carbonization in the electric furnace extract and an extract be process according to a conventional method, high-concentration mineral mixture will be obtain. In addition, the forced drying of the desiccation may be carried out by making it season naturally in air, and warming again, or leaving it in a desiccator. Moreover, you may make it freeze-dry.

[0015] Commercial vinegar is sufficient, although water or an aquosity medium is good as a solvent used for an extract and a hydrophilic organic solvent meltable in water and water and the mixed solvent of water are specifically desirable. In addition, although ester, such as carboxylic acids, such as ketones, such as alcohols, such as a methanol, ethanol, and isopropanol, an acetone, and a methyl ethyl ketone, an acetic acid, and a propionic acid, ethyl acetate, and butyl acetate, is mentioned as an organic solvent, organic acids are desirable and an acetic acid is desirable especially. It is desirable that is not so extensive, for example, when it is ethanol, as for the content of such a hydrophilic solvent, it is desirable to consider as ethanol 2 thru/or three parts by volume or more per water 1 part by volume. As a concrete example, they are vinegar, such as grain vinegar and fruit vinegar, and these. What carried out demineralization processing of the vinegar is suitable, and especially desirable.

[0016] In addition, as long as it is the electric furnace currently generally used for heating, fusion, a chemical reaction, measurement, etc. in the industrial world as an electric furnace used for baking carbonization, what kind of thing may be used, but since the leaf, the petiole, stem, or rhizome of a papaya is non-conductive Are good to use preferably an indirect electric arc furnace, a high-frequency furnace, a low frequency furnace, etc., and to presuppose that a heating rate is as gradual as possible. Whenever [ stoving temperature ] for example, to at most 800 degrees C It is to 300 thru/or 400 degrees C preferably, and can prevent mineralizing completely the organometallic compound contained to the leaf and stem of a papaya by carrying out like this.

[0017] although the leaf of a papaya and the piece of stem fracture 1 weight section are immersed in the aquosity medium 3 thru/or ten parts by volume in order to extract the leaf, the petiole, stem, or rhizome of the dried papaya by water or the aquosity medium after it fractures for example, -- this immersion fluid -- usually -- the bottom of a room temperature or heating -- several hours thru/or dozens of hours -- desirable -- 3 -- or it holds for 10 hours. It is good to perform an extract bywater under heating. Moreover, the aquosity medium of optimum dose, for example, the aquosity medium of the amount of several times, is added, and the carbide of the leaf of a papaya, a petiole, a stem, or a rhizome does not

have several hours, 1 [ for example, ], and it is immersed for 2 hours and it extracts it. The salt of a common quantum metal and a minute amount indispensable metal can obtain such extract mixture with high yield as mixture by filtering with NUTTSUE or a filter-paper and carrying out concentration hardening by drying of the obtained filtrate under reduced pressure. In addition, since vitamins, such as B-carotene, vitamin B1, B-2, and C, are obtained by the mixture and coincidence of a metal salt which are obtained when an aqueous medium performs the leaf of a papaya, and the extract of a leaf and a scapus, the advantage that vitamins can be taken in arises by taking in these extract metals. In addition, the metal salt obtained is presumed to be that in which the most exists as a gestalt of a hydroxide or an oxide from on extract operation.

[0018] In order to perform the recovery and correction of a disease or a failure which originate in the lack of intake of an essential trace element especially again in order to prevent and prevent the imbalance of a mineral In the state of that the mixture of the useful metal salt of this invention remains as it is, or an aqueous medium extract Whether by the technical field concerned, it mixes with the proper excipient of the shape of a well-known solid-state, a basis, a diluent, etc., and uses as an internal use agent Or a vitamin compound, It can blend and mix at drinkable preparations, other supplements, etc., can add to seasoning agents, such as FURIKAKE, laver, and sesame salt, can blend and mix at seasonings, such as bean paste and soy sauce, or can blend with processed foods, such as frozen foods.

[0019]

[Example]

[0020] The leaf of example 1 papaya was dried, and it held at 80 degrees C for 12 hours, having been immersed in 3l. of citric-acid water solutions of concentration 10%, and stirring the 1kg gradually. It cooled to the room temperature, and it filtered by NUTTSUE made from \*\*, the leaf and solid content of a papaya were removed, and concentration solidification of the filtrate was carried out under reduced pressure with the aspirator. About the obtained solid, when analyzed about iron, calcium, and vitamins as Lynn and a typical metal, the following results were obtained per 100g of extract solids. : Iron : 18.23mg Lynn : 347.40mg Calcium : 2,312. 00mg The total carotene (as beta carotene) : 2.50mg Vitamin B1 : 0.37mg Vitamin B2 : 2.01mg vitamin C (oxidation type) : 45.49mg Vitamin C (reduction type): It is clear that vitamins, such as calcium, iron and carotene, and vitamin C, are extremely contained in high concentration so that clearly from 0.21mg, i.e., the above-mentioned result.

[0021] Example 2 [0022] The leaf and stem of a papaya were often dried in the desiccator, two kinds of dry matters were put in by \*\*\*\*(ing) about 1 and 5kg in the joint arc type electric furnace for the laboratories whose inner capacity is 3 1,500cm, respectively, heating was started gradually after that, the temperature up was carried out by 400 degrees C, it held for about 1 hour, and carbonization processing was performed. The carbide of the leaf of a papaya was \*\*\*\*(ed) 60.0g and it supplied to the acetic-acid water solution 15 300g%, and it often shook and extract processing was carried out. Concentration hardening by drying was carried out under reduced pressure of an extract, and 40.0g of extract solids was obtained. Moreover, 55.0g of carbide of a trunk scapus was \*\*\*\*(ed), in addition to the acetic-acid water solution, it often shook 15 300.0g%, and extract processing was carried out. Concentration hardening by drying was carried out under reduced pressure of an extract, and 32.6g of extract solids was obtained. The analysis result of the metal content which followed these two kinds of extract solids is collectively shown in the following table.

[0023]

The carbide of a leaf Carbide of a scapus Sodium 0.7% 1.8% Potassium 9.1% 8.4% Manganese 0.1% 0.1% Magnesium 6.3% 7.0% Calcium 8.4% 8.8% Iron 34.1 ppm 29.2ppm Copper 3.52 ppm 3.10 ppm Zinc 23.1 ppm 24.6 ppm Arsenic <0.01ppm <0.001ppm[0024] Example 3 [0025] The leaf of a papaya was dried and crushed, 1501.3 g was supplied to 30.7l. water, and was heated, and it held in the state of ebullition for 1 hour. It cooled radiationally and filtered even to the room temperature and insoluble matter was removed, subsequently heating ebullition of the \*\*\*\* was carried out, the whole was condensed even to 1l., and 1,258g of solutions was obtained. Moreover, the rhizome of a papaya was dried and crushed, 307.4g was supplied to 1.5l. water, and was heated, and it held in the state of ebullition for 1 hour. It cooled radiationally and filtered even to the room temperature and insoluble

have several hours, 1 [ for example, ], and it is immersed for 2 hours and it extracts it. The salt of a common quantum metal and a minute amount indispensable metal can obtain such extract mixture with high yield as mixture by filtering with NUTTSUE or a filter-paper and carrying out concentration hardening by drying of the obtained filtrate under reduced pressure. In addition, since vitamins, such as B-carotene, vitamin B1, B-2, and C, are obtained by the mixture and coincidence of a metal salt which are obtained when an aqueous medium performs the leaf of a papaya, and the extract of a leaf and a scapus, the advantage that vitamins can be taken in arises by taking in these extract metals. In addition, the metal salt obtained is presumed to be that in which the most exists as a gestalt of a hydroxide or an oxide from on extract operation.

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matter was removed, subsequently heating ebullition of the \*\*\*\* was carried out, the whole was condensed even to 1l., and 1,000g of solutions was obtained.

[0026] It \*\*\*\*(ed) 10ml at a time, and two kinds of concentration liquid obtained above was moved to the Kjeldahl flask, and the nitric acid was added until the reaction was completed adding and heating a 10ml nitric acid. The quantum of the content of calcium, magnesium, and zinc was carried out for reaction mixture with the atomic absorption spectro-photometer after radiationnal cooling. The result is shown collectively below.

[0027]

Ca(mg/l) Mg(ng/l) Zn(mg/l)

Leaf of a papaya 70 5,400 23 Rhizome of a papaya 26 580 0.8



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(54) 【発明の名称】 ババイヤに由来する金属塩混合物及びその製造方法

(57) 【要約】

【目的】 亜鉛、銅、鉄やマンガンの微量必須金属の塩とカルシウム、カリウム、マグネシウムおよびナトリウムの常量金属の塩とから成る金属塩混合物を安価に、効率よく而も人体の摂取に好ましい状態でババイヤから製造し、提供すること。

【構成】 亜熱帯から熱帯地方にかけて広範に栽培されているババイヤの葉、葉柄、茎または根基部を乾燥し、そのまままたは電気炉等で焼成炭化処理した後水または水性媒体で抽出することによって亜鉛、銅、鉄やマンガンの微量必須金属の塩とカルシウム、カリウム、マグネシウムおよびナトリウムの常量金属の塩とから成る金属塩混合物が簡単にかつ高収量で得られる。なおこの金属塩混合物は、ビタミン類をも豊富に含有しているため、

人体の摂取に適しており、幅広い用途が可能であり、従来廃棄されていたババイヤの葉、葉柄、茎や根茎の有効利用にも資する。

## 【特許請求の範囲】

【請求項1】パパイアの葉、葉柄、茎または根茎から抽出して得られる金属塩混合物

【請求項2】金属塩混合物が、カルシウム、カリウム、マグネシウムおよびナトリウムの常量元素の塩ならびに亜鉛、鉄、銅およびマンガンの微量必須元素の塩とから成る、請求項1に記載された金属塩混合物。

【請求項3】パパイアの葉、葉柄、茎または根茎を乾燥し、そのまままたは電気炉などで高温加熱して炭化処理した後水または水性媒体で抽出することからなる、請求項1または2に記載された金属塩混合物の製造方法。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、パパイア（またはパパイア）、特にパパイアの葉、葉柄、茎または根茎から得られる有用金属類、即ちカルシウム、カリウム、マンガン、マグネシウム、ナトリウム、鉄、銅、亜鉛、ナトリウム等の有用金属の塩の混合物およびかかる金属塩混合物を抽出により製造する方法に関する。

## 【0002】

【従来の技術】海は、生命誕生の場所でありまた生物は、空気、水、大地等成育環境から栄養源を摂取している。そのため生物は、生息環境に依存して種々の元素を含有しており、例えば人体には、地球上で発見されている92種の元素のうち、約60種の元素が存在していることが知られている。

【0003】生体内の元素分布状況は、種類や成育環境などで若干異なるものの動物や植物に関係なく類似しており、例えば人体には、酸素、炭素、水素、窒素、リンや硫黄を主要構成元素としてまた塩素、カリウム、ナトリウム、マグネシウムやカルシウムを常量元素として含まれるが、その他に数ppmまたはそれ以下の微量でしか存在しない必須微量元素群と称される元素も含有している。このような必須微量元素としては、現在のところケイ素、フッ素、バナジウム、クロム、マンガン、鉄、コバルト、ニッケル、銅、亜鉛、ヒ素、セレン、モリブデン、スズおよびヨウ素の15元素が認定されているが、何れも重金属元素であり、生体の主要構成元素が所謂軽い元素であるのと対照的である。これらの必須微量元素である重金属元素は、生体内では酵素または補酵素としてまたビタミンとして極微量ながら重要な役割を果たしており、その存在量や摂取量は、元素の種類や発育段階、性別などによって異なるものの、生物体内で微量に存在する場合に限って、生物の正常な成育や生命活動の維持に必須であり、数多くの生理学的反応や生物の高度でかつ複雑な機能に深く関与している。

【0004】これら微量必須元素はの人体内含量は、平均して鉄が4.0g、亜鉛が2-2.3g、マンガンが0.20g、銅が0.1g、またその他のセレン、ニッケル、コバルト、クロム等残存必須微量金属が合計し

て0.1g程度であるとされている。中でも亜鉛、鉄および銅は、生体内で多数の酵素群を形成しており、またマンガンは、スーパーオキシドディスムターゼの構成元素であり、生体の機能や生命反応に直接関与している。

【0005】一方微量必須元素は、微量であることが必須条件であり、換言すれば、これらの微量元素は微量に存在する時に限って生体に有効に作用するのであって、所謂適量範囲を越えると過剰症を生じ、その過剰障害は致命的である場合が多い。即ち、微量元素は、前述したように重金属元素であり、それ故に毒性元素と表裏一体を成していると言っても過言でなく、その適量範囲は、元素の種類、生体の種、性別、生体の大きさや発育段階などによって異なるのであるが、一般的にいって極めて狭いのが特徴である。

【0006】他方では、近年伝統的な和食に対する嗜好が全般的に低下するのに伴い、パンなどのインスタント食品、加工食品やスナック食品などの普及が加速し、これらの極端な偏った摂食に伴い、カルシウムなどの常量元素やビタミンの欠乏による脚気、骨折などの栄養不良疾患の他に、微量必須元素の欠乏が数多くの疾病や障害の発症に関与していることが明らかになってきている。このような疾病や障害としては、例えば必須微量元素の欠乏症の典型的のものとして、ヨウ素による甲状腺腫、セレンや鉄による貧血症、亜鉛元素による成長障害、精子減少症、前立腺肥大や味覚異常、クロムによる糖・脂質代謝異常に関連した無精子症、皮膚や眼の諸疾患、鉄元素欠乏による貧血症などが挙げられる。特に亜鉛は、DNAおよびRNAの合成、細胞分裂やタンパク質合成に必要な不可欠な元素であり、大脳や神経系の形成・発達、頭髮や爪の発育、網膜やブドウ膜の機能、従って視力の維持、皮膚の新陳代謝、従って乾癬、創傷など皮膚疾患の治療、嗅覚機能の維持など広範な人体各部のの機能に深く係っている。

## 【0007】

【発明が解決しようとする課題】このような微量必須元素類は、種々の動物性食品および植物性食品に含まれているが、わが国は火山性土壌であり、従って欧米の石灰性土壌に較べて一部の蓄積植物を除いて土壌に成育する植物およびこのような植物を摂食する動物ともその金属含有量が低い。その代わり、わが国の河川水、地下水、湖沼水などの天然水は、金属含量が相対的に低くpHはほぼ中性であり、飲用に適しており美味であるという利点があるが、常量元素および必須微量元素類を摂取する上では全体として不利であることは否めない。

【0008】我が国では、穀物を主食として野菜類に加えて古来魚貝類や海藻類などを栄養価の高い旬のものを多量に摂ることによってこのような土壌に起因する栄養学上の欠陥を補ってきたのであるが、近年促成栽培、養殖などの農業・漁業分野における技術改革によって季節性が薄れ、アミノ酸、ビタミン、ミネラル等の栄養分の

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アンバランスという問題を招来している。そのため、一般的な成人病の他に上記したとき必須微量元素の欠乏に由来する疾患や障害が増加の一途を辿っているわけであり、これに対処するために例えば貧血症治療剤としての塩化第一鉄など、天然鉱物由来の無機化合物や化学的に合成した無機薬品をベースとしたミネラルサプリメント類が市販されている。しかしながら、高齢者や幼若者、また成人でも健康状態など摂取条件によって吸収性が低くなったりまた顕著な副作用が発現するなど、必ずしも満足するべきものではない。また特に微量元素の場合、その適量範囲が元素によって異なるほか通常は極めて狭いため、服用適性や副作用等の点で化学的に合成した無機化合物では到底対応出来るものではない。

【0009】

【課題を解決するための手段】本発明者らは、このような状況に鑑みて経口摂取しても吸収性がよく而も副作用の少ないミネラル成分を開発するべく種々検討を鋭意続けてきたが、その結果意外にもパパイヤの葉・幹基部および葉部をそのまままたはこれらを炭化処理した後水性媒体で抽出することによって、常量元素および微量元素から成る有用金属混合物が簡単に、高収率で而も人体の摂取に好ましい状態で得られることを見出し、本発明を完成した。

【0010】パパイヤ (*Carica papaya*) は、熱帯アメリカ原産のパパイア科の常緑高木であって、亜熱帯および熱帯各地において汎く栽培されている。成育の早い果樹であり、高さは3-4メートルに達し、播種してその年には結実し、条件がよければその生命は5年以上である。パパイヤの果実は、長さが20ないし40cm、幅が10ないし20cm、重さが0.45ないし2kgで、果肉は桃黄色ないし紅色で特有の臭いがあるが、風味があり美味である。パパイヤの栽培は極めて簡単であるため、熱帯地帯はもとより亜熱帯の大半の国で栽培されており、完熟果実は、朝食時のフルーツとしてまたサラダ、パイ、ジュース、ケーキとして食される他、未熟果実はシロウリのように野菜として利用され、人々の食生活においては重要な位置を占めている。

【0011】またパパイヤの未熟果実に浅い傷をつけると白色の汁が滲出して凝固するが、これを弱火で乾燥させ粉末とすることによってタンパク分解酵素であるパパインが得られる。このタンパク質分解酵素は、キモパパイン等ともに消化不良等の治療薬としてまた食肉のテンダライザーとして古くから用いられて来たが、最近アメリカ、カナダ等では直接患部に注入する椎間板症の治療薬として脚光を浴びている。

【0012】パパイヤの果実は、内部に中空部を有しており、傷み易く長距離輸送には耐えられないため、商品としての流通も栽培地区にのみ限定されたものであり、また果実以外の用途としては、原産地などの原住民が鶏

などの獣肉をパパイヤの葉に包んで柔らかくして、料理に供することしか知られていない。

【0013】パパイヤの幹は単幹で、内部は中空であり、長い葉柄を有する巨大な掌状葉が頭頂部から出るが、一般に気温が10℃以下になると枯死するほか、老木になると結実が少なくまた果実も小さくなるため、成木は早目に伐採され次の播種・栽培に備えるので、廃木の生成量は思いの他多量である。

【0014】本発明者らは、樹齢が比較的短く、従って多量に生成するパパイヤの葉、葉柄、茎または根茎などの廃棄物の有効利用に着目し鋭意研究を重ねた結果、パパイヤの葉、葉柄、茎または根茎を乾燥し、粉碎して次いでそのまま水または水性媒体で抽出するかまたは電気炉などで炭化した後水または水性媒体で抽出することによって、意外にも常量元素のみならず微量必死元素からなる有用金属混合物が得られることを見出し、本発明を完成した。即ち、パパイヤ樹を果実を採取した後根元部で伐採して根茎を掘り起こし、葉、葉柄、茎または根茎を適宜の大きさに乾燥して粉碎し、そのまま水または水性媒体で抽出するかまたは電気炉において焼成炭化させた後水または水性媒体で抽出し、抽出液を常法にしたがって処理すれば、高濃度のミネラル混合物が得られるのである。なお乾燥は、空气中で自然乾燥させてもよくまた加温するかまたはデシケータ中に放置することによって強制乾燥させてもよい。また凍結乾燥させても構わない。

【0015】抽出に使用する溶媒としては水または水性媒体がよく、具体的には水および水に可溶である親水性有機溶媒と水の混合溶媒が好ましいが、市販の食酢でもよい。なお有機溶媒としては例えば、メタノール、エタノール、イソプロパノール等のアルコール類、アセトン、メチルエチルケトン等のケトン類、酢酸、プロピオン酸等のカルボン酸類、酢酸エチル、酢酸ブチル等のエステル類などが挙げられるが、有機酸類が好ましく、中でも酢酸が好ましい。このような親水性溶媒の含有量は、余り大量でないのが好ましく、例えばエタノールの場合は、水1容量部につきエタノール2ないし3容量部以上とするのが好ましい。具体的な例としては、穀物酢や果実酢などの食酢やこれら食酢を脱塩処理したものが好適であり、特に好ましい。

【0016】なお焼成炭化に用いる電気炉としては、一般に産業界で加熱、融解、化学反応、測定などに使用されている電気炉であれば如何なるものでもよいが、パパイヤの葉、葉柄、茎または根茎が非導電性であるので、例えば間接アーク炉や高周波炉、低周波炉などが好ましく用いられ、加熱速度は出来るだけ緩徐とするのがよく、加熱温度は高々800℃まで、好ましくは300ないし400℃までであり、こうすることによってパパイヤの葉や茎に含有される有機金属化合物を完全に無機化するのを防止できる。

【0017】乾燥させたババイヤの葉、葉柄、茎または根茎は、破断した後水または水性媒体で抽出するには、例えばババイヤの葉や茎破断片1重量部を水性媒体3ないし10容量部に浸漬するが、かかる浸漬液を通常は室温または加熱下で数時間ないし数十時間、好ましくは3ないし10時間保持する。水での抽出は加熱下で行うのがよい。またババイヤの葉、葉柄、茎または根茎の炭化物は、適量の水性媒体、例えば数倍量の水性媒体を加えて数時間、例えば1ないし2時間浸漬して抽出する。このような抽出混合物は、ヌツツェまたはフィルターペーパーによりろ過し、得られたろ液を減圧下で濃縮乾固することによって常量金属および微量必須金属の塩が混合物として高収量で得ることができる。なおババイヤの葉や葉・幹茎の抽出を水性媒体で行った場合、得られる金属塩の混合物と同時に、ベータカロチン、ビタミンB1、B2やCなどのビタミン類も得られるので、かかる抽出金属類を摂取することによって、ビタミン類も摂取できるという利点が生じる。なお、得られる金属塩はその大半が、抽出操作上から水酸化物又は酸化物の形態として存在しているものと推定される。

【0018】ミネラルのアンバランスを防止・予防する\*

鉄	:	18.23mg
リン	:	347.40mg
カルシウム:		2,312.00mg
総カロチン(β-カロチンとして):		2.50mg
ビタミンB1:		0.37mg
ビタミンB2:		2.01mg
ビタミンC(酸化型):		45.49mg
ビタミンC(還元型):		0.21mg

即ち、上記結果から明かなように、カルシウム、鉄およびカロチン、ビタミンCなどのビタミン類が極めて高濃度に含まれていることが明らかである。

【0021】実施例2

【0022】ババイヤの葉と茎をデシケーター中でよく乾燥させ、二種類の乾燥物をそれぞれほぼ1.5kgを秤取して内容量が1,500cm<sup>3</sup>である実験室用の関節アーク式電気炉内に入れ、その後緩徐に加熱を開始し、400℃までに昇温して約1時間保持して炭化処理を行った。ババイヤの葉の炭化物を60.0g秤取し ※

	葉の炭化物	茎部の炭化物
ナトリウム	0.7%	1.8%
カリウム	9.1%	8.4%
マンガン	0.1%	0.1%
マグネシウム	6.3%	7.0%
カルシウム	8.4%	8.8%
鉄	34.1ppm	29.2ppm
銅	3.52ppm	3.10ppm
亜鉛	23.1ppm	24.6ppm
砒素	<0.01ppm	<0.001ppm

【0024】実施例 3

\*ためにまた特に必須微量元素の摂取不足に由来する疾患や障害の治癒や矯正を行うために、本発明の有用金属塩の混合物はそのまままたは水性媒体抽出液の状態で、当該技術分野で公知である固体状の適宜の賦形剤、基剤、希釈剤などと混合して経口投与剤として用いるかまたはビタミン剤、ドリンク剤やその他の栄養補助剤などに配合・混入するか、フリカケ、ノリ、ゴマ塩などの味つけ剤に添加するか、味噌、醤油などの調味料に配合・混合するかまたは冷凍食品等の加工食品に配合することができ。

【0019】

【実施例】

【0020】実施例1

ババイヤの葉を乾燥し、その1kgを10%濃度のクエン酸水溶液3リットルに浸漬し、緩徐に攪拌しながら80℃に12時間保持した。室温に冷却して、磁製ヌツツェで濾過してババイヤの葉や固形分を除去し、ろ液をアスピレータで減圧下において濃縮固化した。得られた固形物について、リン、代表的な金属として鉄およびカルシウムならびにビタミン類について分析したところ、抽出固形物100g当たり以下のような結果が得られた:

鉄	18.23mg
リン	347.40mg
カルシウム:	2,312.00mg
総カロチン(β-カロチンとして):	2.50mg
ビタミンB1:	0.37mg
ビタミンB2:	2.01mg
ビタミンC(酸化型):	45.49mg
ビタミンC(還元型):	0.21mg

※て、300gの15%酢酸水溶液に投入し、よく振盪して抽出処理した。抽出液を減圧下において濃縮乾固して、抽出固形物40.0gを得た。また幹茎部の炭化物55.0gを秤取して、300.0gの15%酢酸水溶液に加えて、よく振盪して抽出処理した。抽出液を減圧下において濃縮乾固し、抽出固形物32.6gを得た。これら二種類の抽出固形物について行った金属含有量の分析結果を下記表にまとめて示す。

【0023】

★50【0025】ババイヤの葉を乾燥して破砕し、150

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1.3gを30.7リットルの水に投入して、加熱し沸騰状態で1時間保持した。室温にまで放冷して、濾過して不溶物を除去し、次いで露液を加熱沸騰させて全体を1リットルにまで濃縮して、溶液1、258gを得た。またパパイヤの根茎を乾燥して破碎し、307.4gを1.5リットルの水に投入して、加熱し沸騰状態で1時間保持した。室温にまで放冷して、濾過して不溶物を除去し、次いで露液を加熱沸騰させて全体を1リットルに\*

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\*まで濃縮して、溶液1、000gを得た。

【0026】上記にて得られた二種類の濃縮液を10mlずつを秤取して、キエルダールフラスコに移し、10mlの硝酸を添加し、加熱しながら反応が完了するまで硝酸を追加した。放冷後、反応液を原子吸光度計でカルシウム、マグネシウムおよび亜鉛の含量を定量した。その結果を以下にまとめて示す。

【0027】

	Ca (mg/l)	Mg (ng/l)	Zn (mg/l)
パパイヤの葉	70	5,400	23
パパイヤの根茎	26	580	0.8

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技術表示箇所

C